

Anthrax (*Bacillus anthracis*)

(Also known as Woolsorter Disease)

Report Immediately

November 2003

1) THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Anthrax is a disease caused by the bacterium *Bacillus anthracis*. It is primarily a disease of wild and domestic animals.

B. Clinical Description and Laboratory Diagnosis

Anthrax is an acute bacterial disease, which usually involves the skin, but may involve the upper throat, lower respiratory tract, chest cavity or intestinal tract. Toxins produced by the bacteria cause the tissue and organ damage.

In anthrax affecting the skin (cutaneous anthrax), usually itching of an exposed skin surface occurs first. Itching is followed by a small red lesion that progresses to a blister and, ultimately, a scabbed ulcer (eschar) with extensive local edema. Roughly 5% to 20% of people with untreated cutaneous anthrax die, although prompt treatment with effective antibiotics can reduce the risk to less than 1%.

Initial symptoms of anthrax of the lower respiratory tract (inhalation anthrax) are usually mild, resembling an upper respiratory infection. Severe symptoms follow within 3 to 5 days, and include respiratory distress, fever and shock, with death following shortly. Chest X-ray examination usually shows multiple abnormalities including mediastinal widening, paratracheal fullness, pleural effusions and parenchymal infiltrates. Hemorrhagic mediastinitis and/or meningitis are frequent severe complications. Treatment rarely prevents death once the severe symptoms begin. Prior to the fall of 2001, the case-fatality rate for inhalation anthrax was reported to be 85–100%. However, in the bioterrorism-initiated outbreak in October 2001, the case-fatality ratio was 45.5% percent (5 of 11 inhalational cases died).

Oropharyngeal and gastrointestinal anthrax are rare forms of disease resulting from the ingestion of infected meat that has not been sufficiently cooked. After an incubation period of 2 to 5 days, patients with oropharyngeal disease present with severe sore throat or local oral or tonsillar ulcers, usually associated with fever, toxicity and cervical or submandibular lymphadenitis. Gastrointestinal anthrax begins with nonspecific symptoms of nausea, vomiting and fever; these are followed in most cases by a severe abdominal pain. Mortality in both forms may be as high as 50%.

Laboratory confirmation is based on identification of *B. anthracis* in blood, skin lesion or discharge by direct stained smears, culture or inoculation of laboratory animal. Rapid identification of the organism is also possible using immunodiagnostic testing, enzyme-linked immunoassay (ELISA) or polymerase chain reaction (PCR). Serological testing is generally of use in making a retrospective diagnosis: anthrax electrophoretic immunotransblot (EITB) reaction to the protective antigen and/or lethal factor bands.

C. Reservoirs

Wild and domestic hoofed herbivores (plant-eating animals), including livestock, are the reservoir of vegetative organisms. When exposed to the environment, the organisms produce spores. Spores, which are very resistant to disinfection and adverse environmental conditions, are capable of surviving in soil for decades. Skins and

hides of infected animals may harbor the spores for years. Worldwide spread of anthrax occurs primarily through dissemination of contaminated skins and hides.

D. Modes of Transmission

Cutaneous infection occurs through: 1) contact with contaminated skins, wool or hides, or products made from these; 2) contact with tissues of animals that are clinically ill or dead from anthrax; or 3) contact with soil contaminated with spores or contaminated bonemeal used in gardening. Inhalational anthrax occurs through inhalation of spores, particularly in environments related to processing of animal hides and wool. It may also occur in association with accidental or intentional aerosolization of spores, as may occur with a laboratory accident or bioterrorist event. Intestinal and oropharyngeal anthrax occurs through ingestion of undercooked contaminated meat.

E. Incubation Period

The incubation period for anthrax is usually 1 to 7 days, and most cases occur within 2 days of exposure. However, incubation periods of up to 60 days have been reported.

F. Period of Communicability or Infectious Period

Person-to-person transmission has not been documented. However, products and soil contaminated with spores may remain infectious for decades.

G. Epidemiology

Anthrax is primarily a disease of wild and domestic herbivorous (plant-eating) animals. Unaffected herds of livestock may be exposed through feed containing contaminated bonemeal. Anthrax is an infrequent and sporadic cause of human disease in the United States and in most industrialized countries. Only 18 cases of inhalational anthrax were reported in the United States from 1900 to 1978, with the majority occurring in special risk groups, including two that were laboratory associated. Prior to October 2001, the last reported case of inhalational anthrax occurred in 1976. In the United States, 224 cases of cutaneous anthrax were reported between 1944 and 1994. Anthrax in animals is common in Central and South America, southern and Eastern Europe, Africa and Asia. Persons at greatest risk of contracting anthrax are those whose occupations may expose them to contaminated meat, hides, or wool, or cultures of the bacteria. Veterinarians and others who handle and treat infected animals are also at risk.

H. Bioterrorist Potential

Bacillus anthracis has been used as a bioterrorist agent. The most recent occurrence in the United States was in the fall of 2001 where 22 cases (11 inhalational cases and 7 cutaneous cases) were related to contaminated letters.

The dissemination of *B. anthracis* causes a serious public health challenge in terms of limiting the numbers of casualties, decontamination and dissemination of accurate and appropriate information to diverse populations.

2) REPORTING CRITERIA AND LABORATORY TESTING SERVICES

A. New Jersey Department of Health and Senior Services (NJDHSS) Case Definition

CASE CLASSIFICATION

A. CONFIRMED:

Clinically compatible case, **AND**

- Isolation of *B. anthracis* from a clinical specimen, **OR**
- Anthrax electrophoretic immunoassay (EITB) reaction to the protective antigen, **OR**
- Lethal factor bands obtained after onset of symptoms, **OR**
- Demonstration of *B. anthracis* in a clinical specimen by immunofluorescence.

B. PROBABLE:

A clinically compatible case that is epidemiologically linked to a confirmed case as determined by the NJDHSS.

C. POSSIBLE:

Initially reported case on the basis of clinical diagnosis until confirmation is obtained. All cases require confirmation; no possible case classifications are retained within the database of the NJDHSS.

NOTE: Isolates of *B.anthraxis* must be submitted within the three (3) working days to the New Jersey Department of Health and Senior Services, Division of Public Health and Environmental Laboratories, Specimen Receiving and Records, P.O. Box 361, John Fitch Plaza, Trenton, NJ 08625-0361.

Note: See Section 3C below for information on how to report a case.

B. Laboratory Testing Services Available

- A. The Public Health and Environmental Laboratory (PHEL) provides confirmatory testing services for all referred isolates of suspected *B. anthracis* from blood, tissue biopsies, discharge fluid, vesicle fluid, etc.
- B. PHEL provides testing services for environmental samples suspected of contamination with *B. anthracis*.
- C. Clinical laboratories are expected to perform initial culture of suspected cases of *B. anthracis*.
- D. Isolates submitted from other laboratories will also be confirmed and/or identified.
- E. Additionally, the PHEL requests that all laboratories submit all isolates of *B. anthracis* cultured for further identification to aid in the public health surveillance necessary for this illness.
- F. Laboratories must contact the NJDHSS Infectious and Zoonotic Diseases Program (IZDP) at 609.588.7500 or 609.392.2000 (Nights and weekends) prior to submitting suspected isolates of *B. anthracis* to the PHEL.
- G. For more information on submitting samples contact the PHEL at 609.292.8396.

3) DISEASE REPORTING AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To identify cases and clusters of human illness that may be associated with a bioterrorist event.
- To identify human and animal cases as early as possible to prevent transmission to other persons or animals, either through direct contact (unlikely) or through spores that form in carcasses of dead animals.
- To identify potential sources of transmission in the United States (e.g., imported wool, livestock, or soil), and to stop transmission from such sources.
- To identify sources of transmission and geographical areas of risk outside the United States and to stop transmission from such sources.

B. Laboratory and Healthcare Provider Reporting Requirements

Due to the rarity, potential severity, and possibility of bioterrorism involvement the New Jersey Department of Health and Senior Services requests that laboratories and healthcare providers **immediately report** to the local health officer having jurisdiction over the locality in which the patient lives, or, if unknown, to the health officer in whose jurisdiction the health care provider requesting the laboratory examination is located any suspect case of anthrax. If this is not possible, call the NJDHSS IZDP at 609.588.7500 during business hours, 609.392.2020, after business hours, on weekends and holidays. Such telephone report shall be followed up by a

written or electronic (using the Communicable Disease Reporting System [CDRS]) report within the 24 hours of the initial report.

C. Local Departments of Health Responsibilities

1. Reporting Requirements

The New Jersey Administrative Code (N.J.A.C. 8:57-1.8) stipulates that each local health officer must report the occurrence of any case of anthrax, as defined by the reporting criteria in Section 2 above. Current requirements are that the cases be **reported immediately** to the NJDHSS IZDP.

Case Investigation

- a. **The most important step a local health officer can take upon he/she learns of a suspect or confirmed case of anthrax, or potential exposure to anthrax, is to call the NJDHSS Communicable Disease Service immediately, any time of the day or night at 609.588.7500 or 609.392.2020 for nights and weekends.**
- b. The NJDHSS Communicable Disease Service will oversee and direct the case investigation of anthrax in New Jersey residents in conjunction with the CDC. If a bioterrorist event is suspected, the NJDHSS and other response authorities will work closely with health officers and provide instructions/information on how to proceed.
- c. Following immediate notification of the NJDHSS, the health officer may be asked to assist in investigating cases that live within their communities, including gathering the following:
 - 1) The patient's name, age, address, phone number, status (hospitalized, at home, deceased), and parent/guardian information, if applicable.
 - 2) The name and phone number of the hospital where the patient is or was hospitalized.
 - 3) The name and phone number of the patient's attending physician if hospitalized.
 - 4) The name and phone number of the infection control professional at the hospital if hospitalized.
 - 5) If the patient was seen by a healthcare provider before hospitalization, or seen at more than one hospital, these names and phone numbers will be needed as well.
- d. Following immediate notification of the NJDHSS, the local health officer may be asked to assist in completing a [CDS-1 form](#). Most of the information required on the form can be obtained from the provider or the medical record.
- e. Use the following guidelines in completing the form:
 - 1) Accurately record demographic information.
 - 2) Record whether the case was intestinal anthrax, inhalational anthrax, cutaneous anthrax, septicemic anthrax, or a combination of these forms of anthrax.
 - 3) Be sure to record date and time of the onset of illness, symptom information and patient status (e.g., recovered, died) accurately.
 - 4) Exposure history: use the longest incubation period for anthrax (1 to 60 days). Specifically, focus on the period beginning a minimum of 1 day prior to the case's onset date back to no more than 60 days before onset for the following exposures:
 - a) Travel history: determine the date(s) and geographic area(s) traveled to by the case to identify where the patient may have become infected.
 - b) Animals/animal products: for cutaneous or inhalational anthrax, ask about exposures to animals and/or animal products.
 - c) Meat consumed: for intestinal or oropharyngeal anthrax, ask about sources of meat consumed.
 - d) Laboratory exposure: determine whether the case works in a laboratory.
 - e) Work history: postal employee, animal handler.

- 5) If there have been several attempts to obtain patient information (*e.g.*, the patient or healthcare provider does not return calls or does not respond to a letter, or the patient refuses to divulge information or is too ill to be interviewed), please fill out the form with as much information as possible. Please note on the form the reason why it could not be filled out completely. **If CDRS is used to report, enter the collected information into the “Comments” section.**
- c. After completing the form, attach lab report(s) and fax to the NJDHSS IZDP at 609.631.4863. Call the NJDHSS IZDP at 609.588.7500 to confirm receipt of your fax.
- d. Institution of disease control measures is an integral part of case investigation. It is the local health officer’s responsibility to understand, and after consultation with NJDHSS, institute the control guidelines listed below in Section 4, “Controlling Further Spread.”

4) CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements (N.J.A.C. 8:57-1.10)

Minimum Period of Isolation of Patient

Until lesions are healed or free of anthrax bacilli, or patient is on antibiotics.

Minimum Period of Quarantine of Contacts

This will be determined by NJDHSS after consultation with Centers for Disease Control and Prevention (CDC).

B. Protection of Contacts of a Case

There is no immunization or prophylaxis for contacts of cases. Standard precautions and aseptic technique are recommended.

C. Managing Special Situations

Reported Incidence Is Higher than Usual/Outbreak Suspected

If any cases of anthrax occur in individuals in a city/town, or if an outbreak is suspected, investigate to determine the source of infection and mode of transmission. Contact the NJDHSS IZDP immediately at 609.588.7500 during business hours or at 609.392.2020 during any other time. The Program staff can help determine a course of action to prevent further cases and can perform surveillance for cases that may cross several jurisdictions and therefore be difficult to identify at a local level.

Note: For a potential bioterrorist event, the NJDHSS and other response authorities will work closely with local health officers and provide instructions/information on how to proceed.

D. Preventive Measures

Environmental Measures

In the event that a food item is epidemiologically implicated in the transmission of disease, implicated food items must be removed from the environment. A decision about culturing implicated food items must be made in consultation with the NJDHSS IZDP staff. Coordination for pickup and testing of food samples is the responsibility of the local health department. If a commercial product is suspected, report this to the NJDHSS Food and Drug Safety Program at 609.588.3123 who will coordinate follow-up with relevant outside agencies.

Personal Preventive Measures/Education

To avoid cases of anthrax, the NJDHSS recommends the following:

- Individuals at significant, continuing risk of acquiring anthrax (*e.g.*, laboratory workers) should be vaccinated.

- Employees who work with hides of potentially infected animals should be educated about anthrax and how to minimize exposures.
- Employees who work in environments involved in outbreaks elsewhere will be handled on an individual basis.

E. Indications for Prophylaxis

The need for prophylaxis is determined by public health officials on the basis of an epidemiologic investigation. Prophylaxis is indicated for persons exposed to an airspace contaminated with *B. anthracis*. Prophylaxis is not indicated for health-care and mortuary workers who care for patients or attend to corpses using standard precautions, for persons who handle or open mail in the absence of a credible threat, or for prevention of cutaneous anthrax.

Successful implementation of mass prophylaxis requires clarity of public health intent and communication, as well as coordination and collaboration. Issues for the point of prophylaxis distribution include layout and managing of traffic flow; security; availability of medical and office supplies, antibiotic and disease fact sheets, multilingual staff, and mental health counselors; legal needs (e.g., for a physician to write orders); and plans for follow-up, including assessment of adherence, illness, and possible drug adverse effects. Collaboration among health departments, health-care delivery organizations, and clinicians is important.

Ciprofloxacin, doxycycline, and penicillin G procaine have been approved by the Food and Drug Administration (FDA) for prophylaxis of inhalational *Bacillus anthracis* infection. Amoxicillin (in three daily doses) is an option for children and pregnant or lactating women exposed to strains susceptible to penicillin, to avoid potential toxicity of quinolones and tetracyclines. Amoxicillin is not widely recommended as a first-line prophylactic agent, however, because of lack of FDA approval, lack of data regarding efficacy, and uncertainty about the drug's ability to achieve adequate therapeutic levels at standard doses. The optimal duration of prophylaxis is uncertain; however, 60 days was recommended, primarily on the basis of animal studies of anthrax deaths and spore clearance after exposure.

ADDITIONAL INFORMATION

An [Anthrax Fact Sheet](http://www.state.nj.us/health) is available at the NJDHSS web site at <www.state.nj.us/health>.

Technical information about anthrax is available from the Centers for Disease Control and Prevention at [CDC Anthrax](http://www.cdc.gov)

The formal Centers for Disease Control and Prevention (CDC) surveillance case definition for anthrax is the same as the criteria outlined in Section 2 A of this chapter. CDC case definitions are used by state health departments and CDC to maintain uniform standards for national reporting. For reporting to the NJDHSS, always use the criteria outlined in Section 2 A.

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